FIG.1

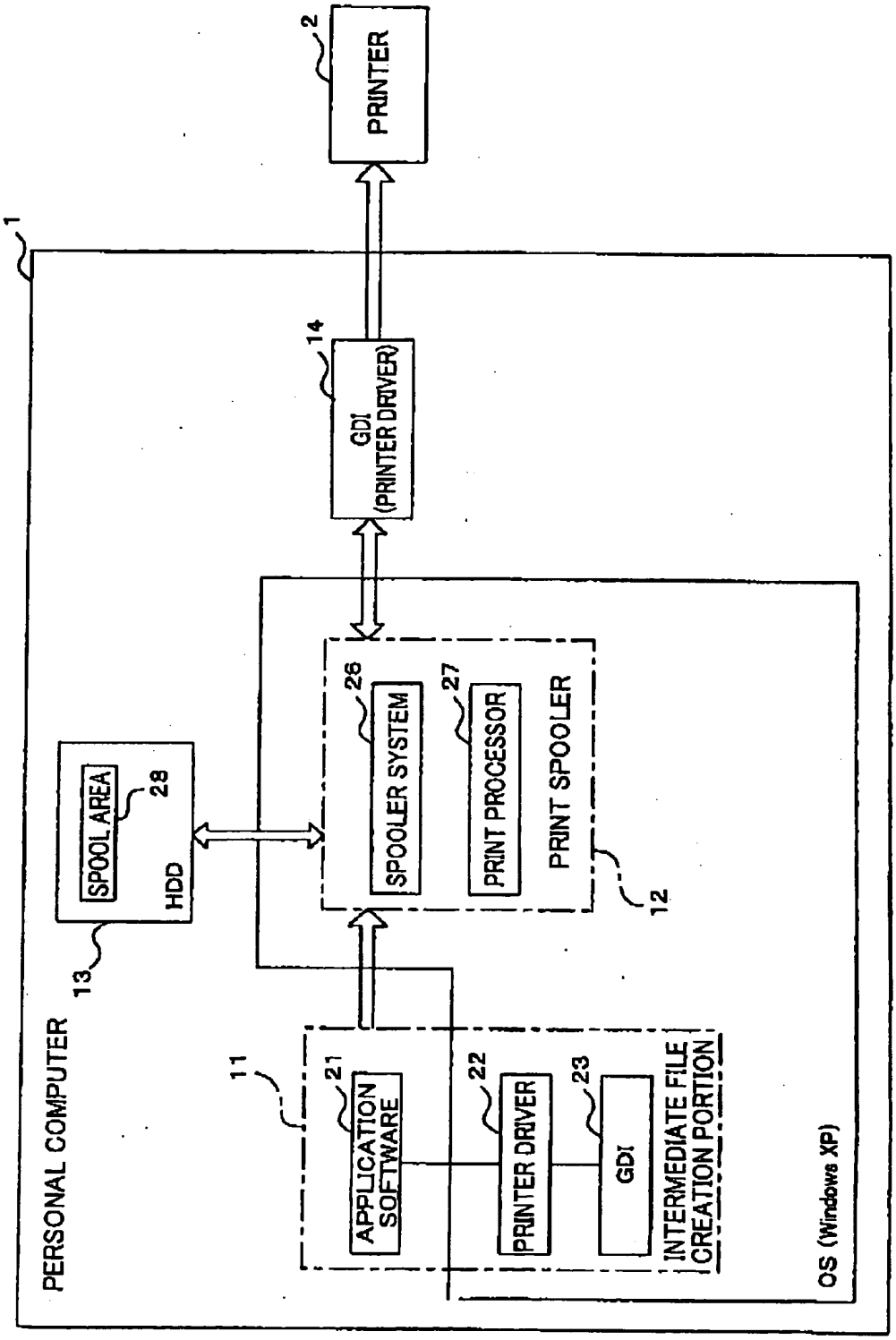
PRINTER
2
1
GDI
(PRINTER DRIVER)
14
SPOOLER SYSTEM
26
PRINT PROCESSOR
27
PRINT SPOOLER
12
SPOOL AREA
28
HDD
13
PERSONAL COMPUTER
11
APPLICATION SOFTWARE
21
PRINTER DRIVER
22
GDI
23
INTERMEDIATE FILE CREATION PORTION
OS (Windows XP)

FIG.2

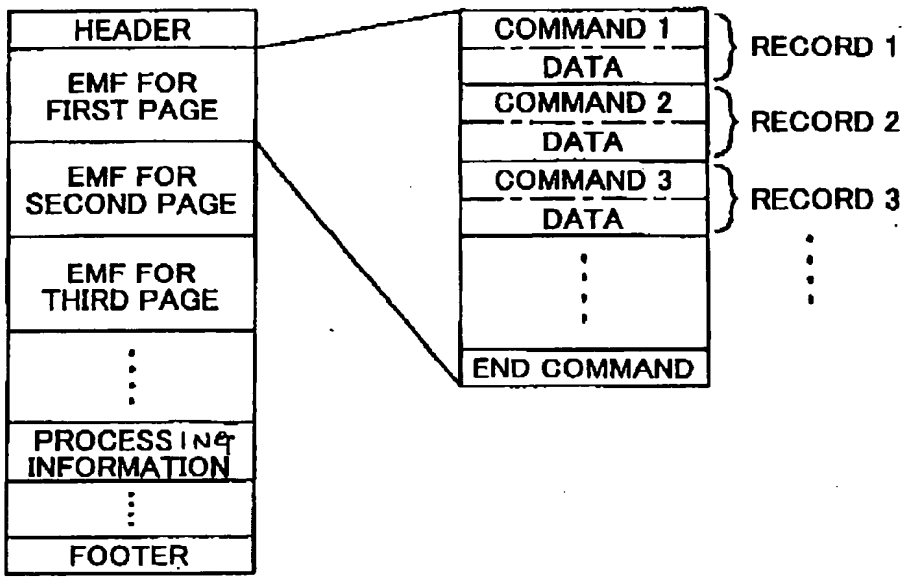

FIG.3(a)

BITMAP DRAWING RECORD

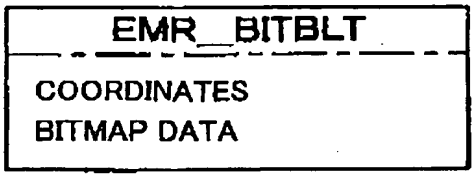

FIG.3(b)

TEXT DRAWING RECORD

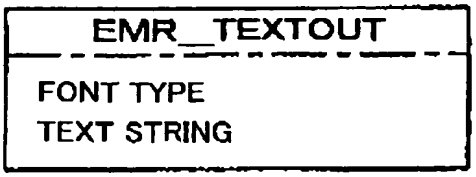

FIG.4

PROCESSING INFORMATION

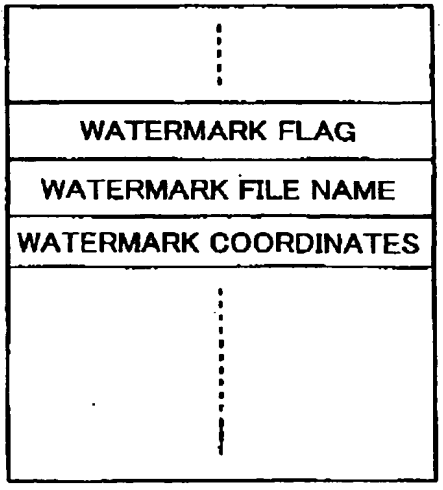

FIG.5

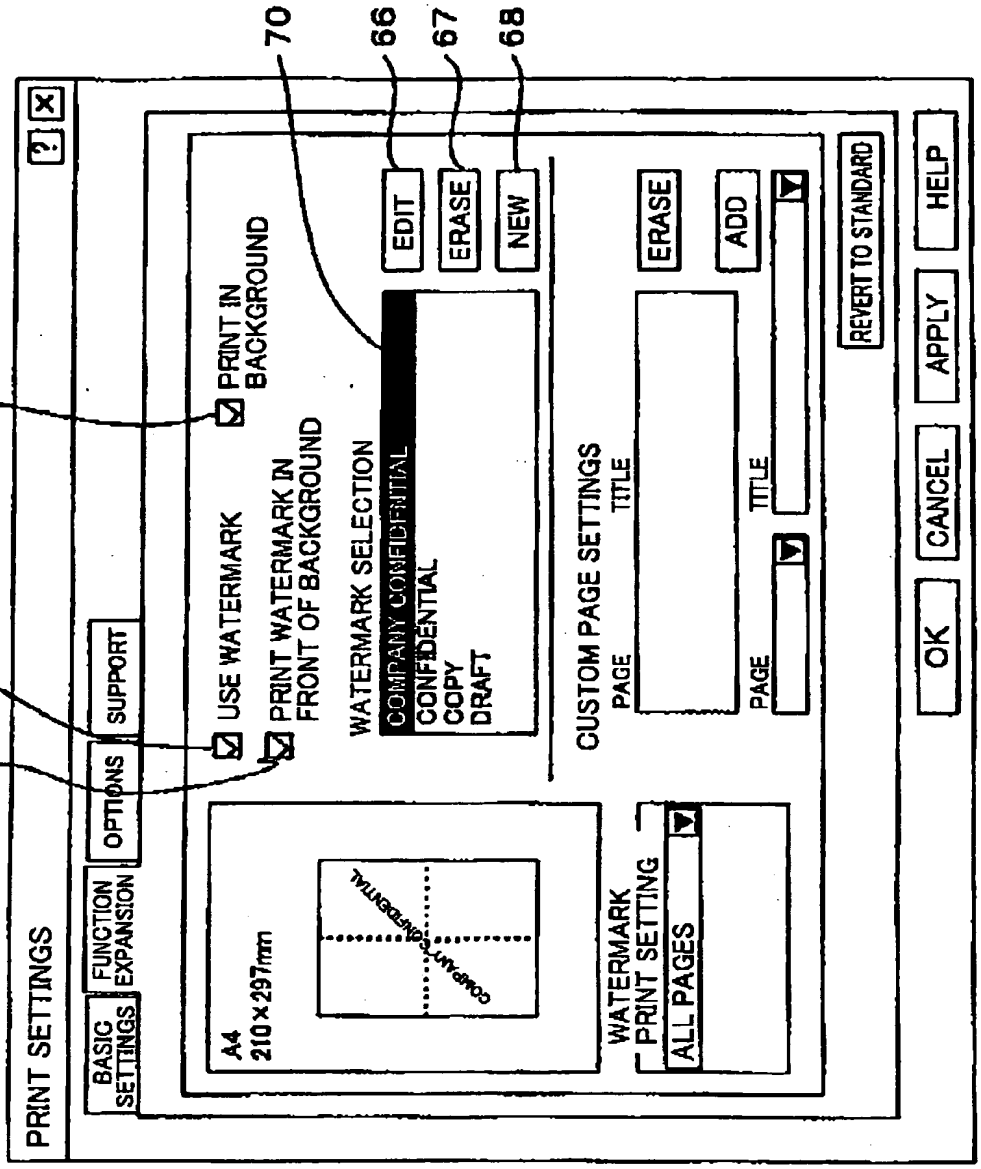
62
61
63
70
66
67
68
PRINT SETTINGS
BASIC SETTINGS
FUNCTION EXPANSION
OPTIONS
SUPPORT
USE WATERMARK
PRINT WATERMARK IN FRONT OF BACKGROUND
PRINT IN BACKGROUND
WATERMARK SELECTION
COMPANY CONFIDENTIAL
CONFIDENTIAL
COPY
DRAFT
EDIT
ERASE
NEW
CUSTOM PAGE SETTINGS
TITLE
PAGE
ERASE
ADD
TITLE
PAGE
REVERT TO STANDARD
A4
210×297mm
WATERMARK
PRINT SETTING
ALL PAGES
OK
CANCEL
APPLY
HELP

FIG.6(a)

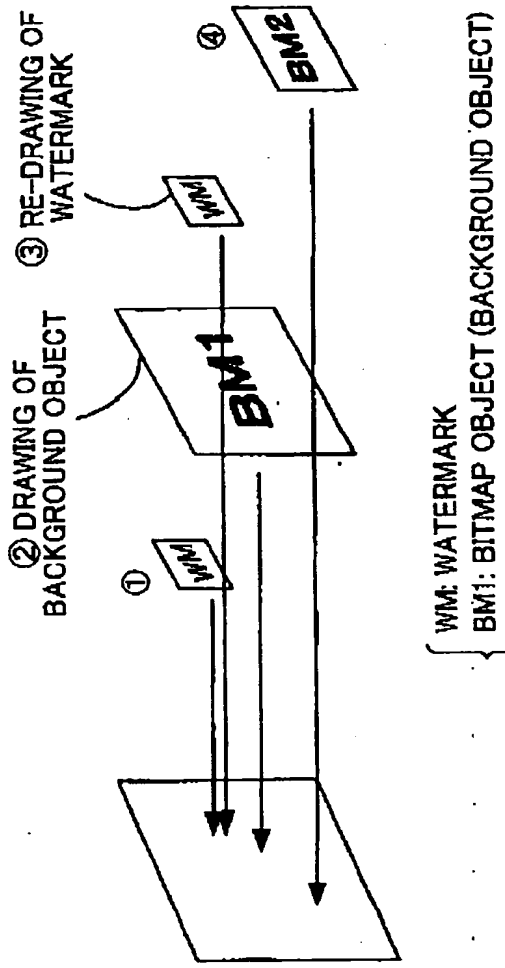
① WM
② DRAWING OF BACKGROUND OBJECT
BM1
③ RE-DRAWING OF WATERMARK
④ BM2
WM: WATERMARK
BM1: BITMAP OBJECT (BACKGROUND OBJECT)
BM2: BITMAP OBJECT

FIG. 6(b)

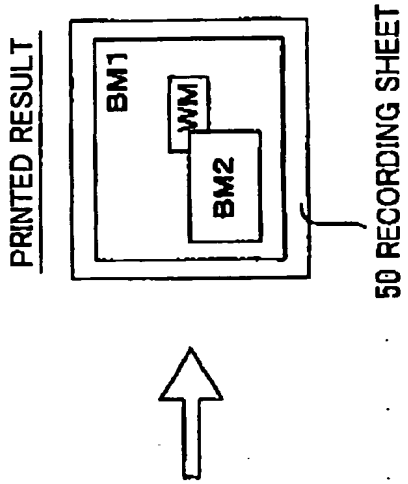
PRINTED RESULT
BM1
WM
BM2
50 RECORDING SHEET

FIG.7

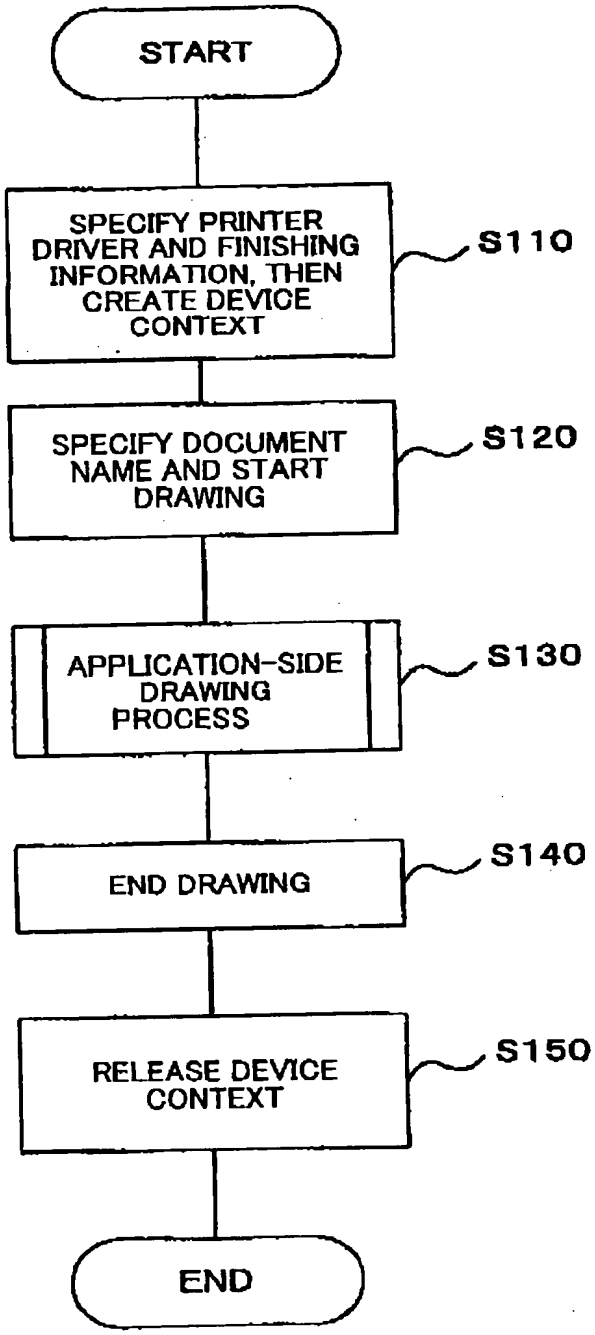
START
SPECIFY PRINTER DRIVER AND FINISHING INFORMATION, THEN CREATE DEVICE CONTEXT
S110
SPECIFY DOCUMENT NAME AND START DRAWING
S120
APPLICATION-SIDE DRAWING PROCESS
S130
END DRAWING
S140
RELEASE DEVICE CONTEXT
S150
END

FIG.8

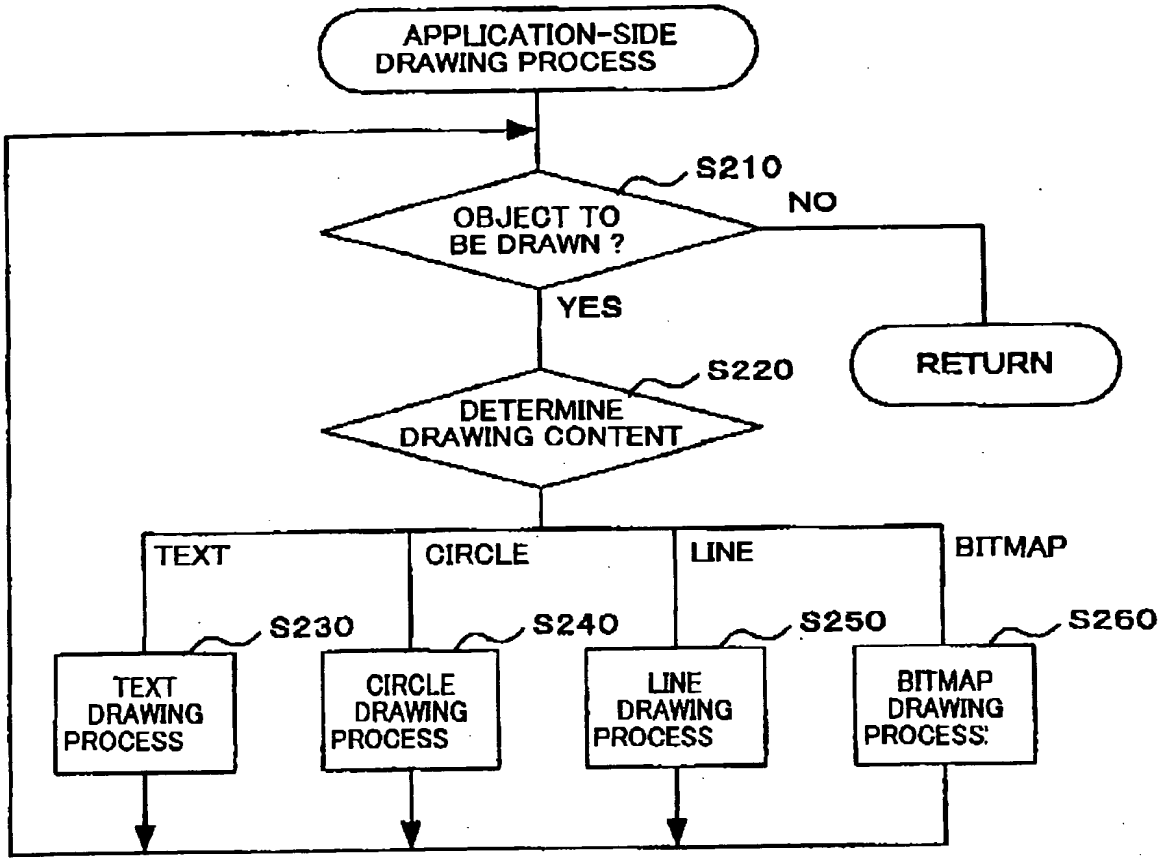
APPLICATION-SIDE DRAWING PROCESS
S210
OBJECT TO BE DRAWN ?
NO
YES
RETURN
S220
DETERMINE DRAWING CONTENT
TEXT
CIRCLE
LINE
BITMAP
S230
S240
S250
S260
TEXT DRAWING PROCESS
CIRCLE DRAWING PROCESS
LINE DRAWING PROCESS
BITMAP DRAWING PROCESS

FIG.9

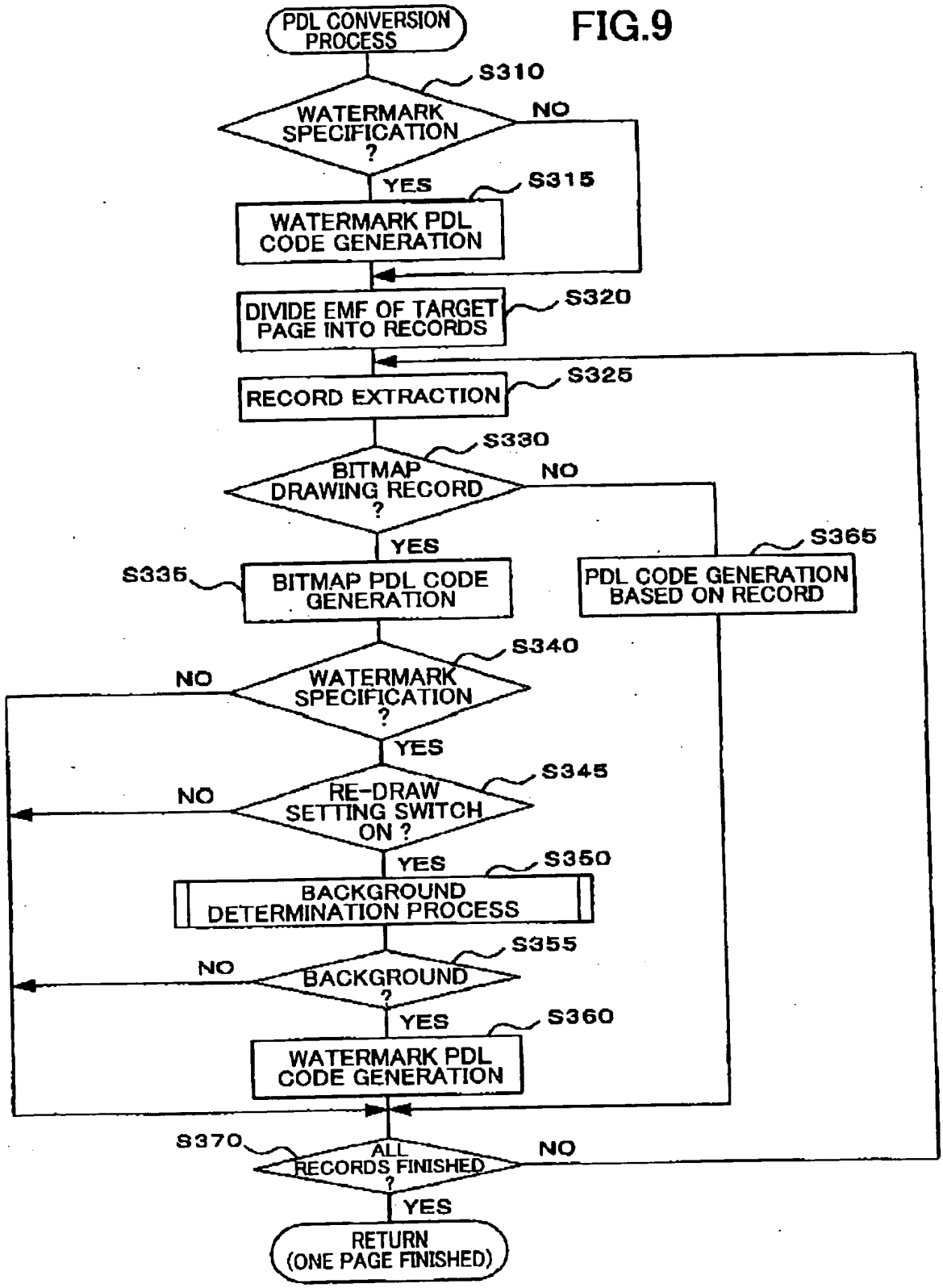
PDL CONVERSION PROCESS
S310
WATERMARK SPECIFICATION ?
NO
YES
S315
WATERMARK PDL CODE GENERATION
DIVIDE EMF OF TARGET PAGE INTO RECORDS
S320
RECORD EXTRACTION
S325
S330
BITMAP DRAWING RECORD ?
NO
YES
S365
S335
BITMAP PDL CODE GENERATION
PDL CODE GENERATION BASED ON RECORD
S340
NO
WATERMARK SPECIFICATION ?
YES
S345
NO
RE-DRAW SETTING SWITCH ON ?
YES
S350
BACKGROUND DETERMINATION PROCESS
S355
NO
BACKGROUND ?
YES
S360
WATERMARK PDL CODE GENERATION
S370
ALL RECORDS FINISHED ?
NO
YES
RETURN (ONE PAGE FINISHED)

FIG.10

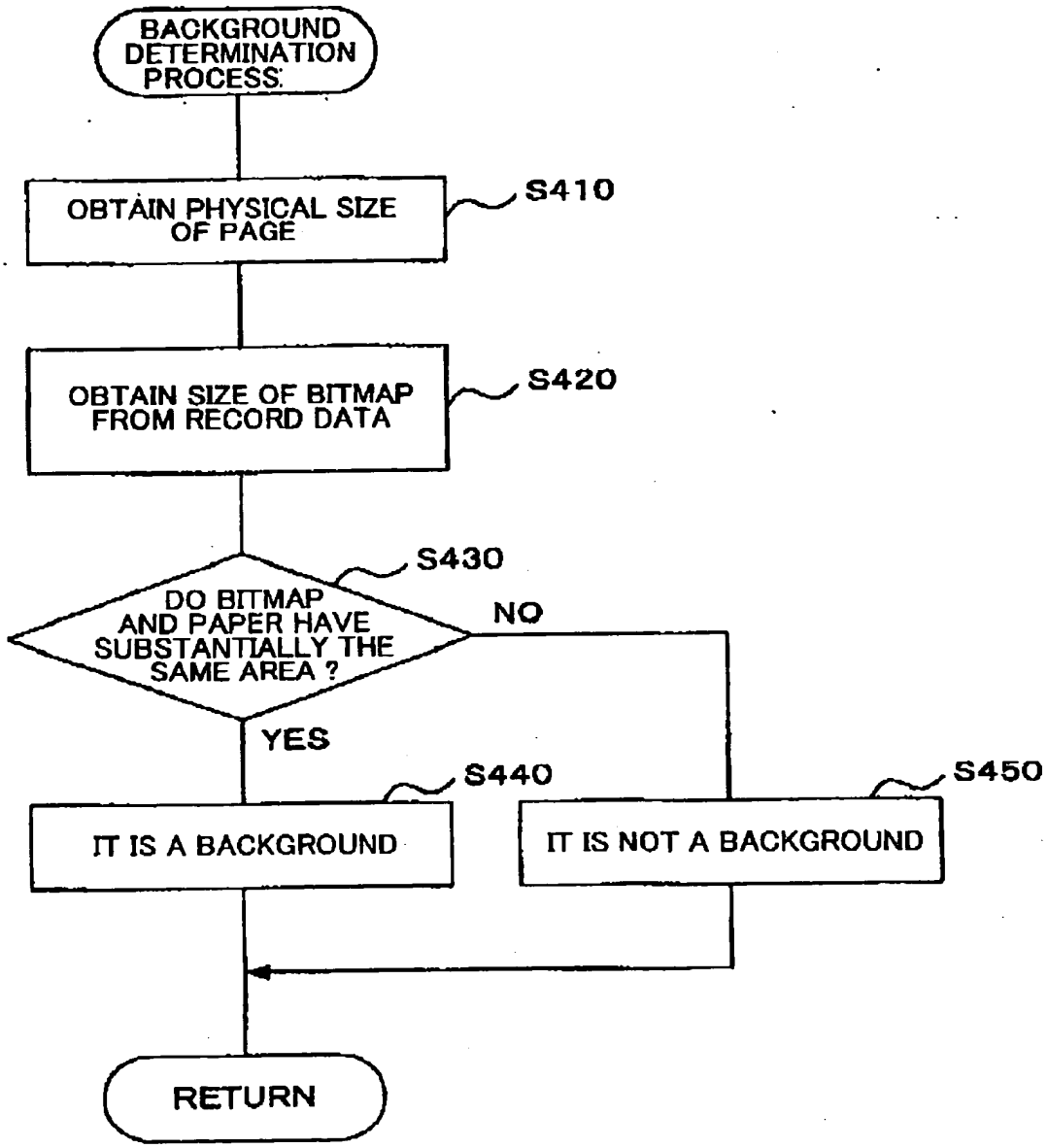
BACKGROUND DETERMINATION PROCESS
OBTAIN PHYSICAL SIZE OF PAGE
S410
OBTAIN SIZE OF BITMAP FROM RECORD DATA
S420
S430
DO BITMAP AND PAPER HAVE SUBSTANTIALLY THE SAME AREA ?
NO
YES
S440
IT IS A BACKGROUND
S450
IT IS NOT A BACKGROUND
RETURN

FIG.11

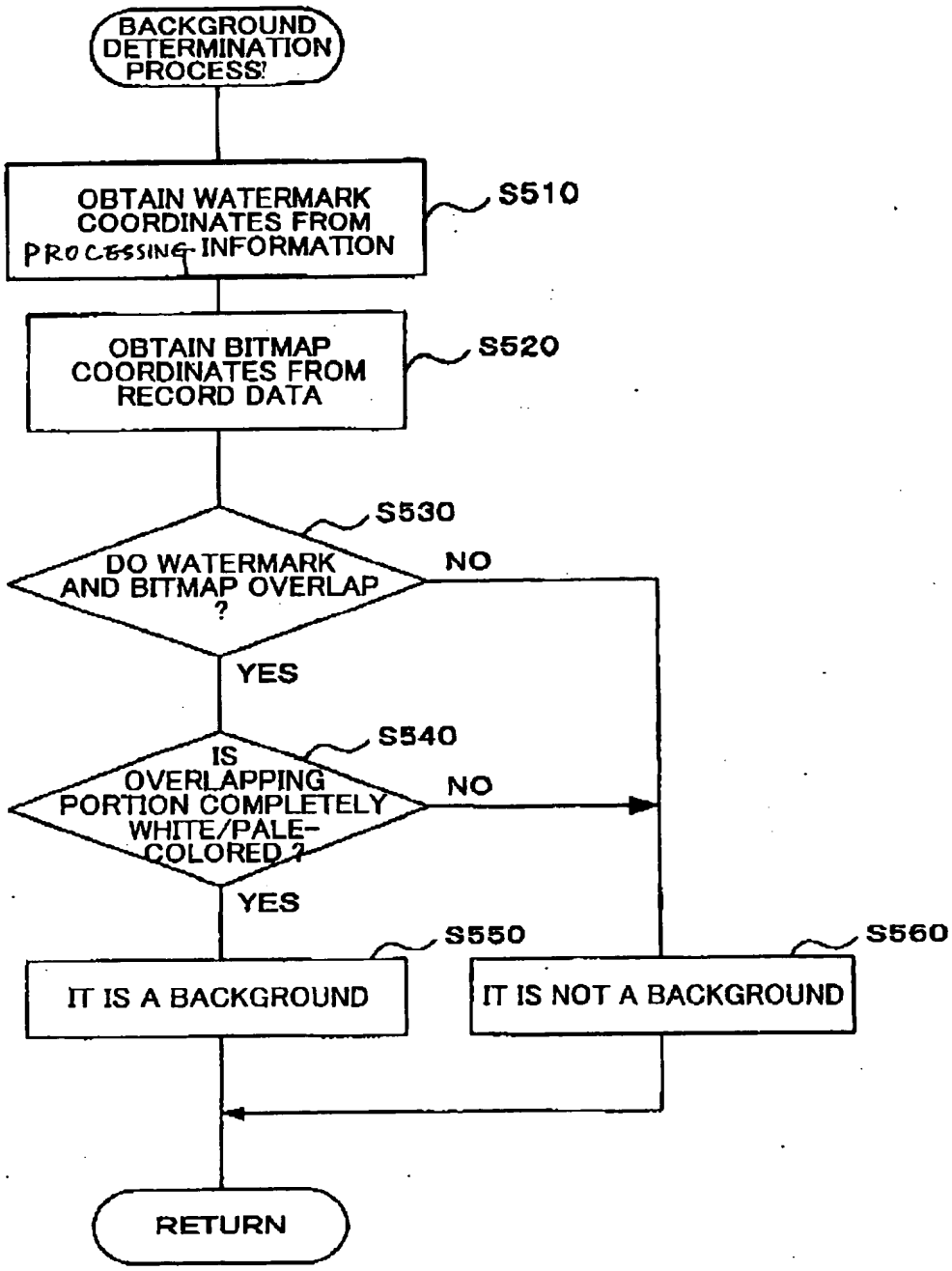
BACKGROUND DETERMINATION PROCESS
OBTAIN WATERMARK COORDINATES FROM PROCESSING INFORMATION
S510
OBTAIN BITMAP COORDINATES FROM RECORD DATA
S520
S530
DO WATERMARK AND BITMAP OVERLAP ?
NO
YES
S540
IS OVERLAPPING PORTION COMPLETELY WHITE/PALE-COLORED ?
NO
YES
S550
IT IS A BACKGROUND
S560
IT IS NOT A BACKGROUND
RETURN

FIG.12

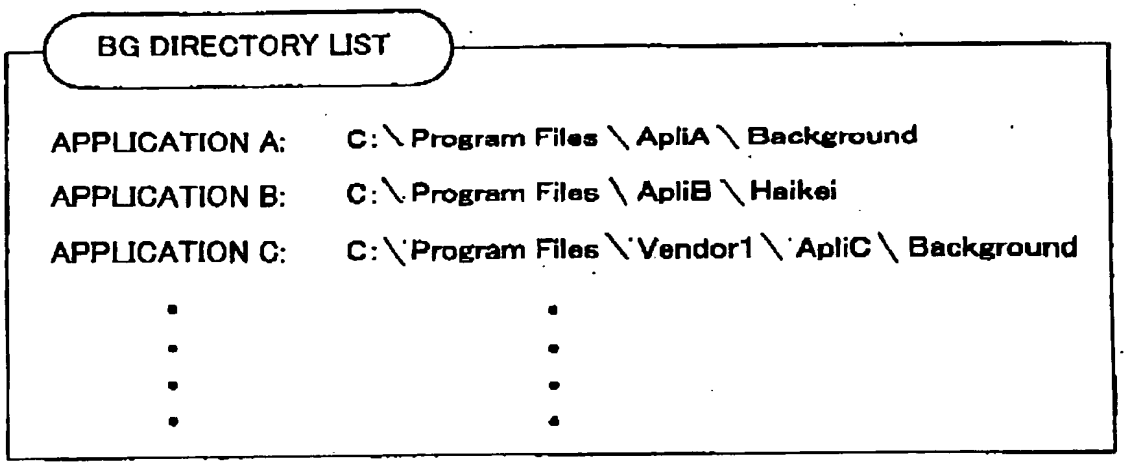
BG DIRECTORY LIST
APPLICATION A:
C:\Program Files\ApliA\Background
APPLICATION B:
C:\Program Files\ApliB\Haikei
APPLICATION C:
C:\Program Files\Vendor1\ApliC\Background

FIG.13

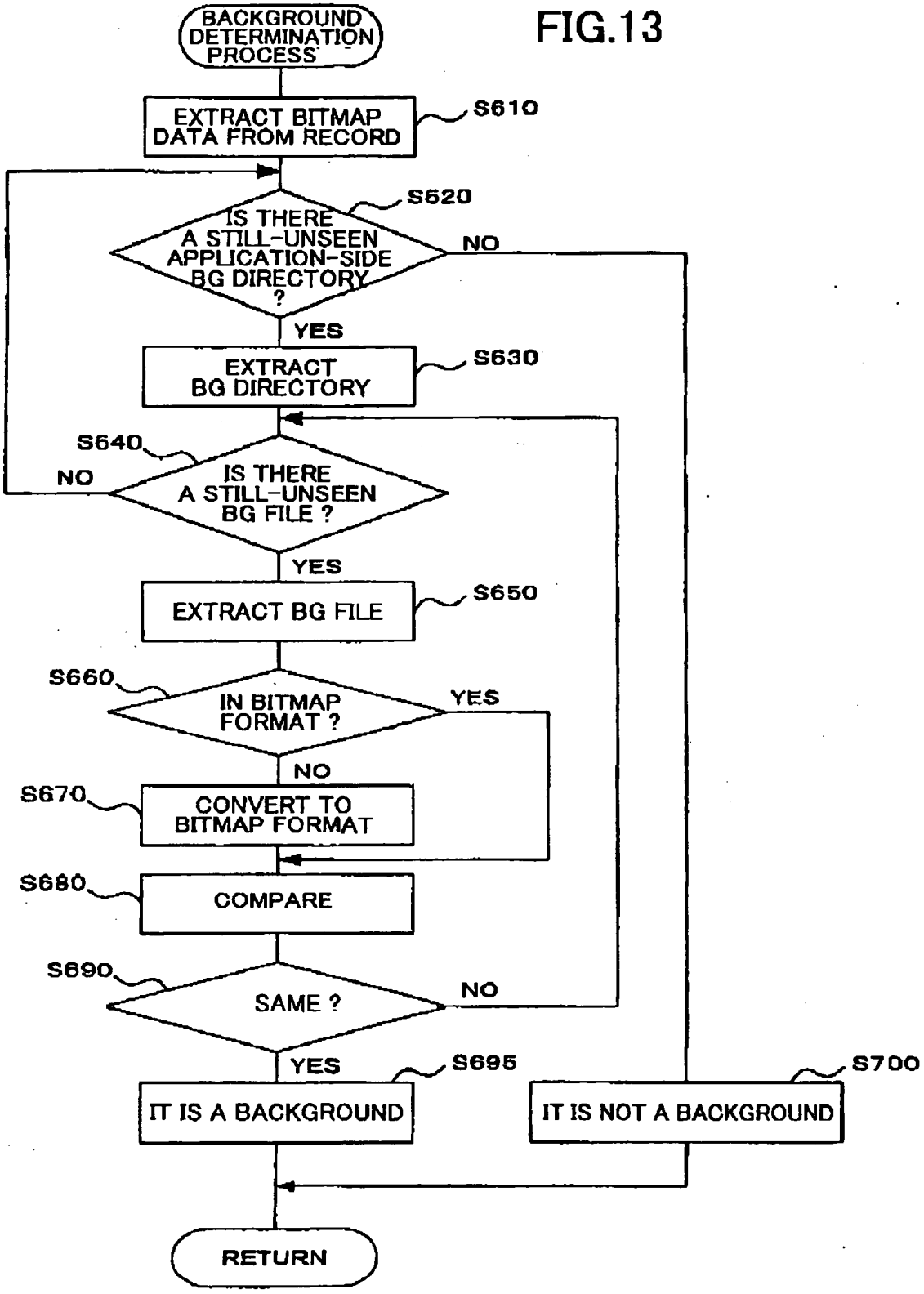
BACKGROUND DETERMINATION PROCESS
EXTRACT BITMAP DATA FROM RECORD
S610
IS THERE A STILL-UNSEEN APPLICATION-SIDE BG DIRECTORY ?
S620
NO
YES
EXTRACT BG DIRECTORY
S630
S640
IS THERE A STILL-UNSEEN BG FILE ?
NO
YES
EXTRACT BG FILE
S650
S660
IN BITMAP FORMAT ?
YES
NO
S670
CONVERT TO BITMAP FORMAT
S680
COMPARE
S690
SAME ?
NO
YES
S695
IT IS A BACKGROUND
S700
IT IS NOT A BACKGROUND
RETURN

FIG.14

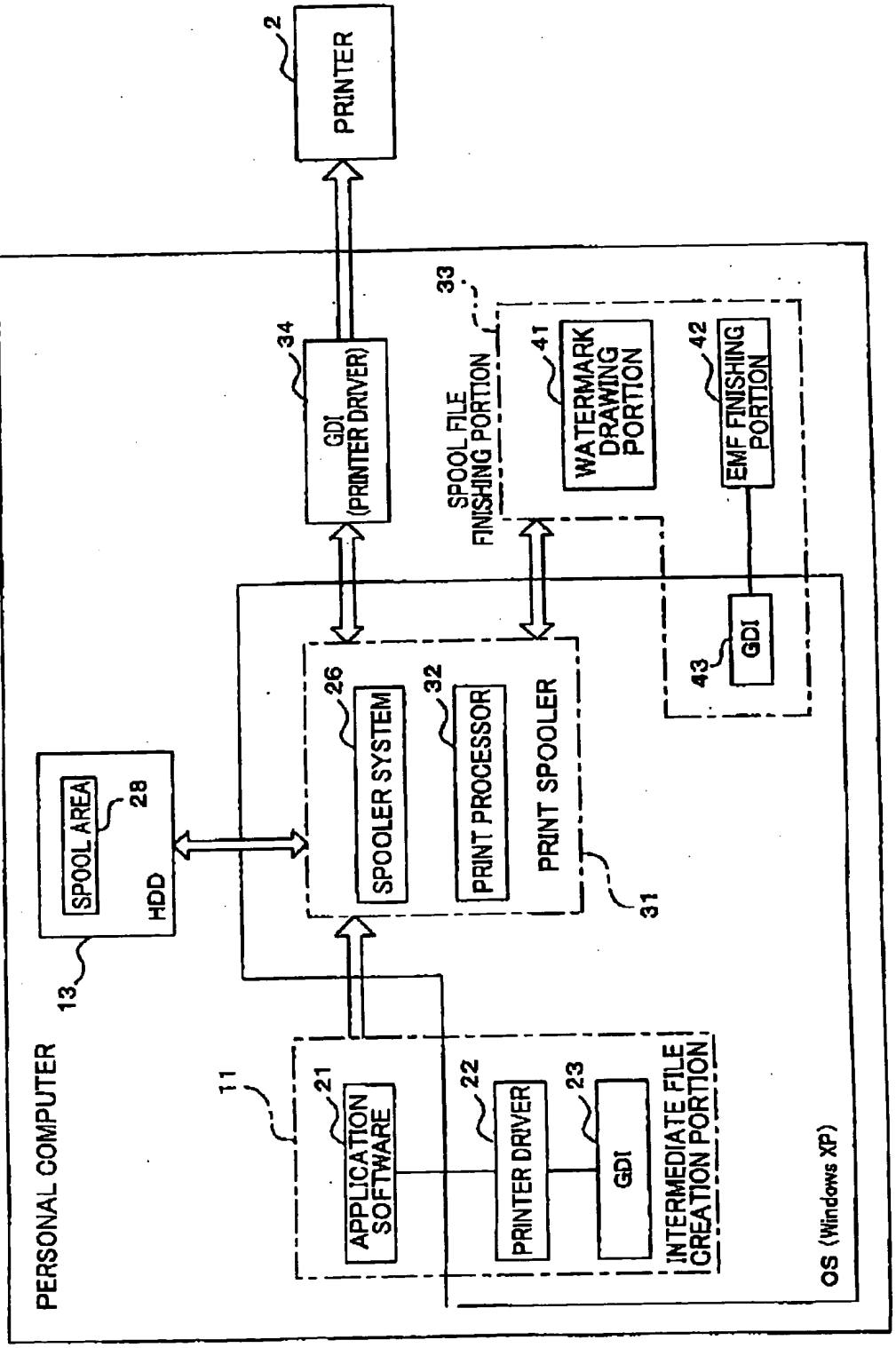
30
PERSONAL COMPUTER
OS (Windows XP)
2
PRINTER
34
GDI
(PRINTER DRIVER)
33
SPOOL FILE
FINISHING PORTION
41
WATERMARK
DRAWING
PORTION
42
EMF FINISHING
PORTION
43
GDI
26
SPOOLER SYSTEM
32
PRINT PROCESSOR
PRINT SPOOLER
31
13
HDD
28
SPOOL AREA
11
INTERMEDIATE FILE
CREATION PORTION
21
APPLICATION
SOFTWARE
22
PRINTER DRIVER
23
GDI

FIG.15

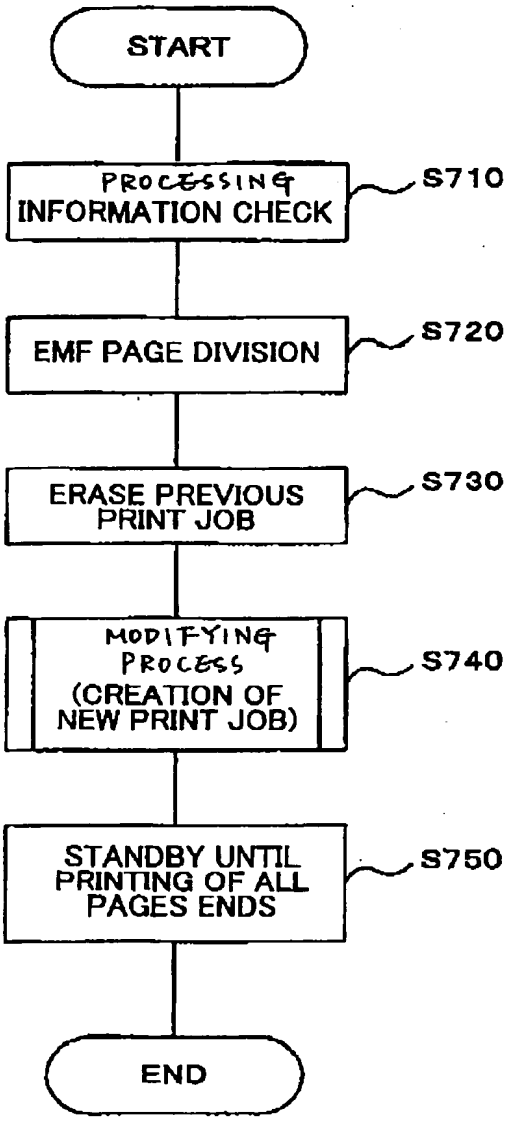
START
PROCESSING INFORMATION CHECK
S710
EMF PAGE DIVISION
S720
ERASE PREVIOUS PRINT JOB
S730
MODIFYING PROCESS (CREATION OF NEW PRINT JOB)
S740
STANDBY UNTIL PRINTING OF ALL PAGES ENDS
S750
END

FIG.16

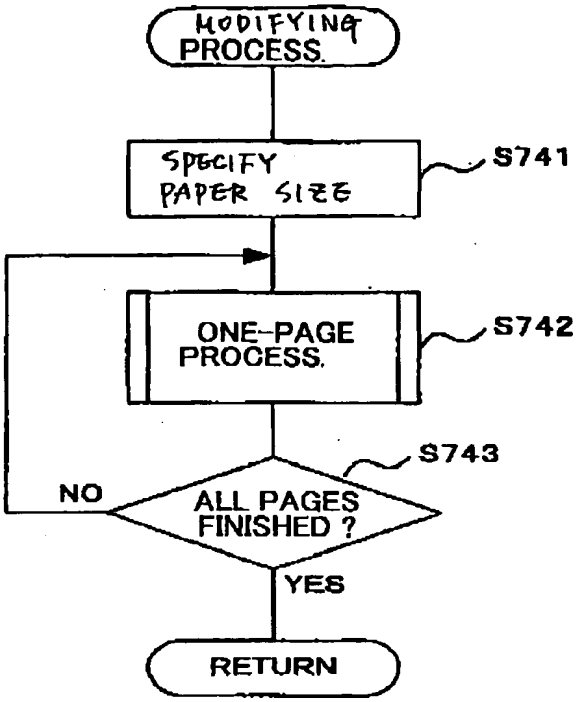
MODIFYING PROCESS
SPECIFY PAPER SIZE
S741
ONE-PAGE PROCESS
S742
S743
NO
ALL PAGES FINISHED ?
YES
RETURN

FIG.17

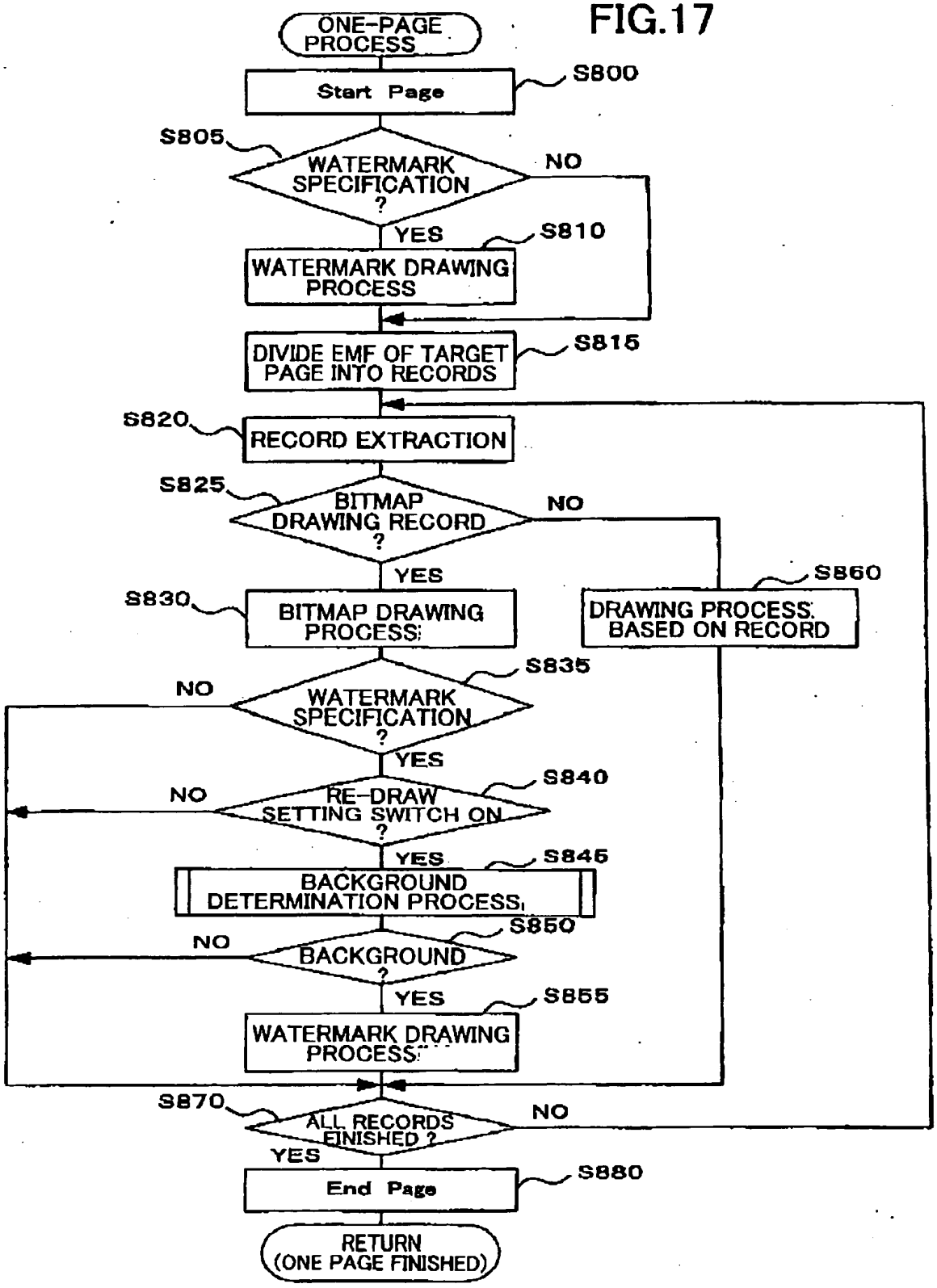
ONE-PAGE PROCESS
Start Page
S800
S805
WATERMARK SPECIFICATION ?
NO
YES
S810
WATERMARK DRAWING PROCESS
DIVIDE EMF OF TARGET PAGE INTO RECORDS
S815
S820
RECORD EXTRACTION
S825
BITMAP DRAWING RECORD ?
NO
YES
S860
DRAWING PROCESS BASED ON RECORD
S830
BITMAP DRAWING PROCESS
S835
NO
WATERMARK SPECIFICATION ?
YES
S840
NO
RE-DRAW SETTING SWITCH ON ?
YES
S845
BACKGROUND DETERMINATION PROCESS
S850
NO
BACKGROUND ?
YES
S855
WATERMARK DRAWING PROCESS
S870
ALL RECORDS FINISHED ?
NO
YES
End Page
S880
RETURN (ONE PAGE FINISHED)

FIG.18

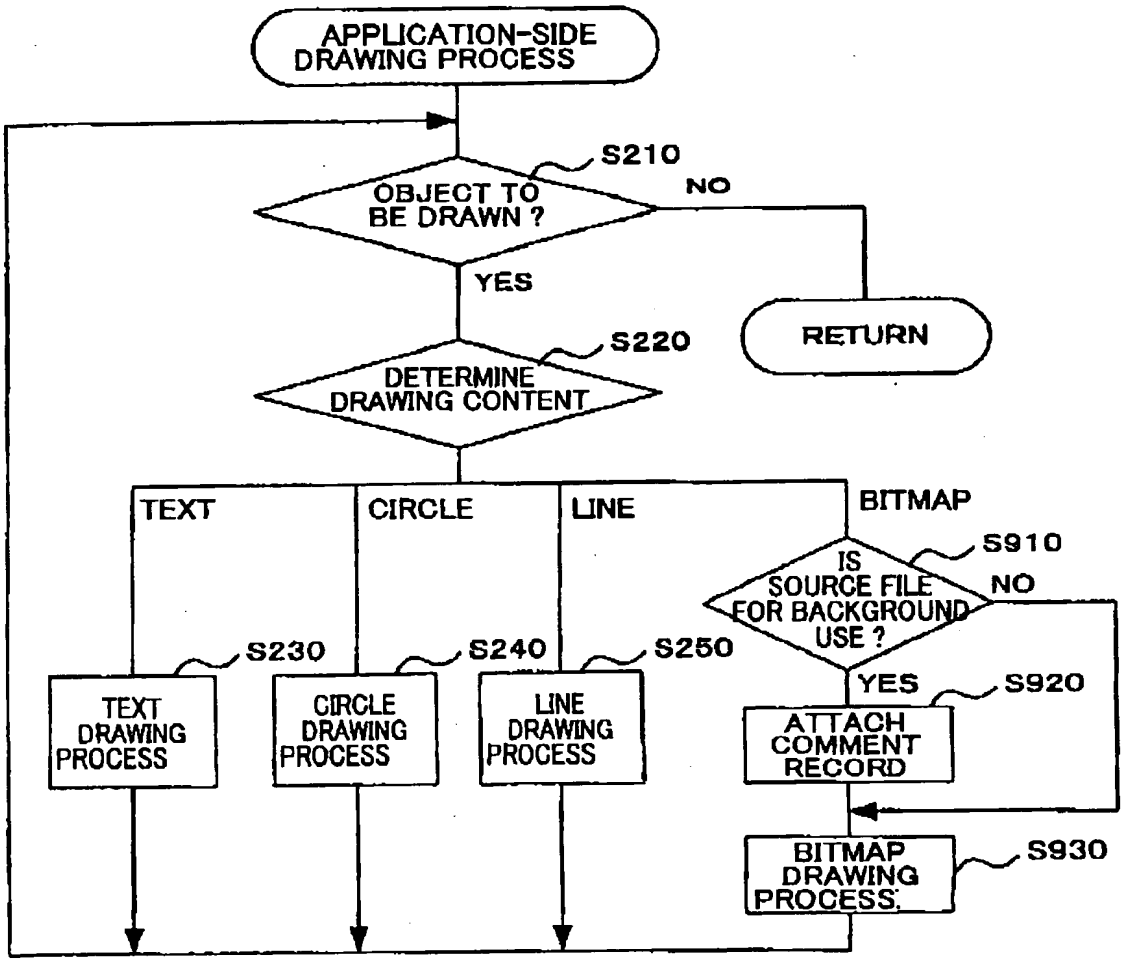
APPLICATION-SIDE DRAWING PROCESS
S210
OBJECT TO BE DRAWN ?
NO
YES
RETURN
S220
DETERMINE DRAWING CONTENT
TEXT
CIRCLE
LINE
BITMAP
S910
IS SOURCE FILE FOR BACKGROUND USE ?
NO
YES
S920
ATTACH COMMENT RECORD
S230
S240
S250
TEXT DRAWING PROCESS
CIRCLE DRAWING PROCESS
LINE DRAWING PROCESS
BITMAP DRAWING PROCESS
S930

FIG.19

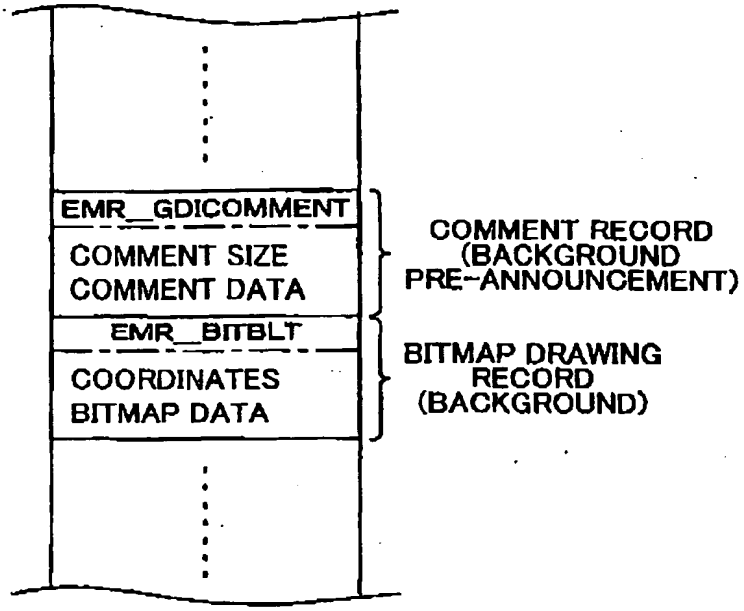
EMR_GDICOMMENT
COMMENT SIZE
COMMENT DATA
EMR_BITBLT
COORDINATES
BITMAP DATA
COMMENT RECORD
(BACKGROUND
PRE-ANNOUNCEMENT)
BITMAP DRAWING
RECORD
(BACKGROUND)

FIG.20

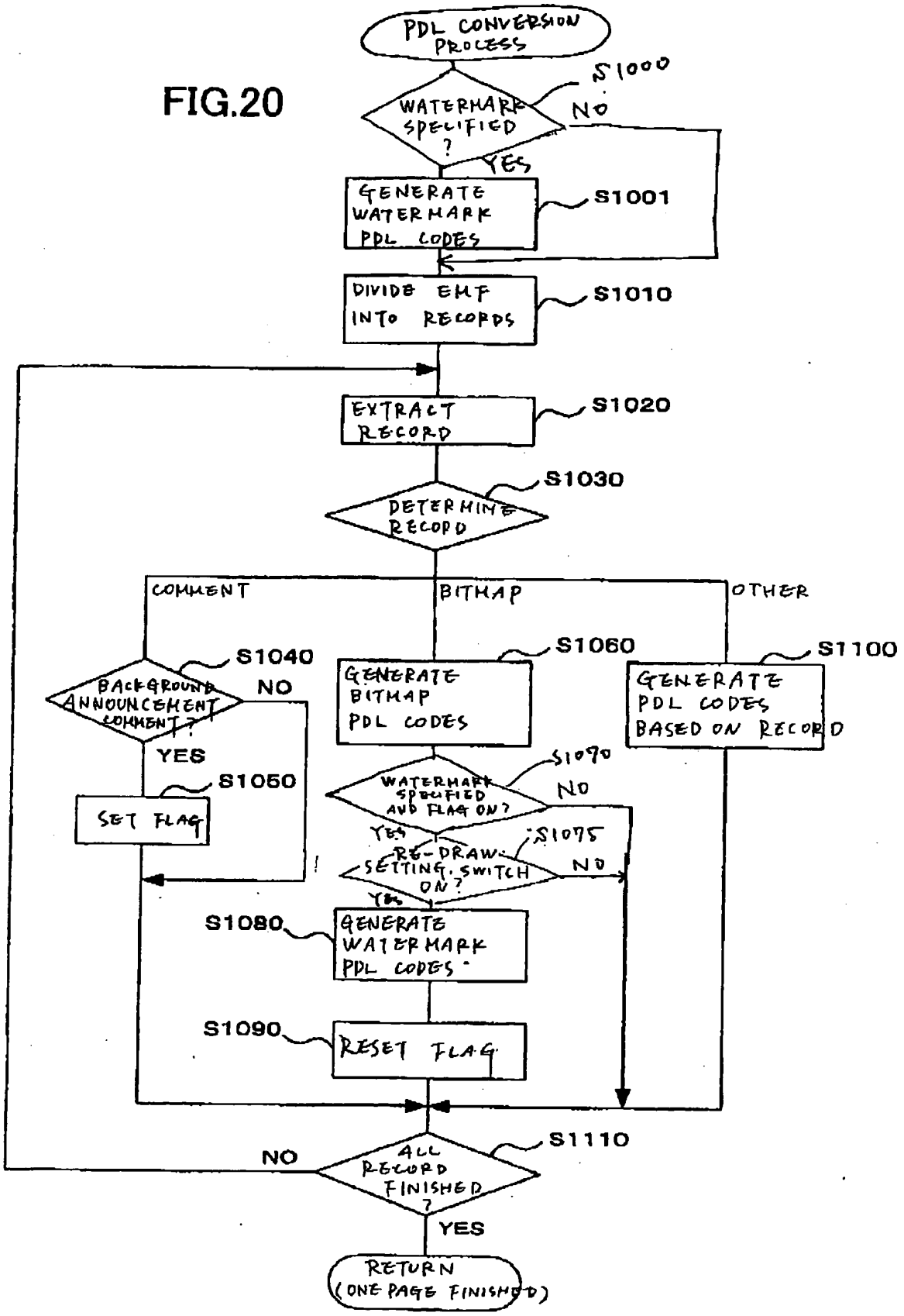
PDL CONVERSION PROCESS
WATERMARK SPECIFIED ?
S1000
NO
YES
GENERATE WATERMARK PDL CODES
S1001
DIVIDE EMF INTO RECORDS
S1010
EXTRACT RECORD
S1020
DETERMINE RECORD
S1030
COMMENT
BITMAP
OTHER
BACKGROUND ANNOUNCEMENT COMMENT ?
S1040
NO
YES
SET FLAG
S1050
GENERATE BITMAP PDL CODES
S1060
WATERMARK SPECIFIED AND FLAG ON ?
S1070
NO
YES
RE-DRAW SETTING SWITCH ON ?
S1075
NO
YES
GENERATE WATERMARK PDL CODES
S1080
RESET FLAG
S1090
GENERATE PDL CODES BASED ON RECORD
S1100
ALL RECORD FINISHED ?
S1110
NO
YES
RETURN (ONE PAGE FINISHED)

FIG.21(a)

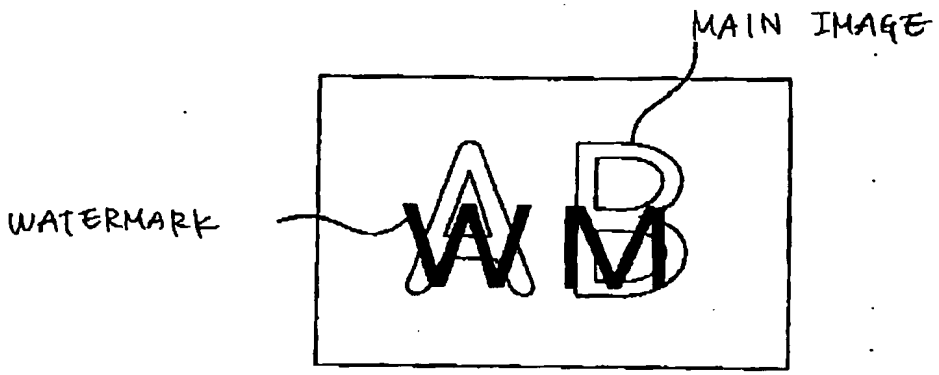

FIG.21(b)

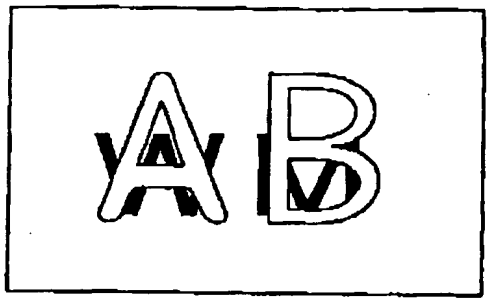
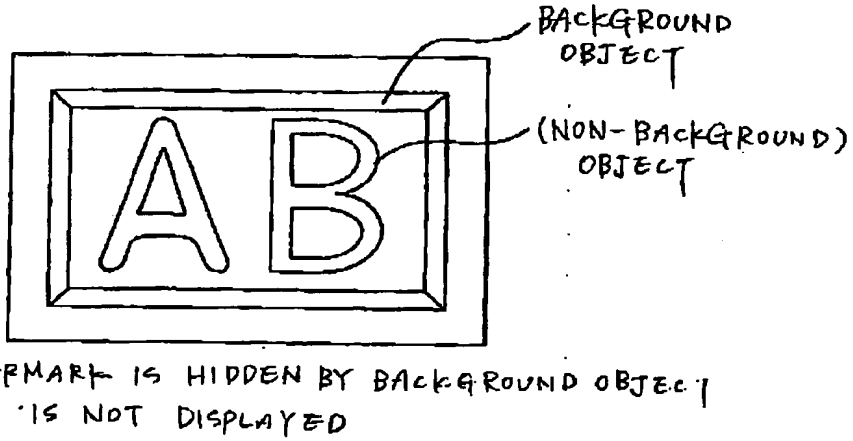
FIG.21(c)